

CLAIMS:

1. A method of authenticating that a test polymer is a tagged polymer, said tagged polymer comprising a substrate polymer, a compound comprising a forensic authentication marker, and a dynamic response authentication marker, said forensic authentication marker being present in the tagged polymer in an amount sufficient to be detected by a forensic analytical technique and said dynamic response authentication marker being present in an amount sufficient to be detected by a dynamic response analytical technique, said method comprising

testing the test polymer for the forensic authentication marker using a forensic analytical technique,

testing the test polymer for the dynamic response authentication marker using a dynamic response analytical technique, and

authenticating that a test polymer is a tagged polymer if the forensic authentication marker and dynamic authentication marker are detected.

2. The method of claim 1 wherein the compound comprising the forensic authentication marker is present in the tagged polymer in an amount that does not affect an optical or rheological property of the substrate polymer.

3. The method of claim 2 wherein the compound comprising the forensic authentication marker is present in the tagged polymer in an amount that does not affect at least one of the optical properties of the substrate polymer selected from the group consisting of total light transmission, light transmission at 650 nm, light transmission at 780 nm, and bi-refringence.

4. The method of claim 3 wherein the compound comprising the forensic authentication marker is present in the tagged polymer in an amount that does not affect total light transmission of the substrate polymer.

5. The method of claim 3 wherein the compound comprising the forensic authentication marker is present in the tagged polymer in an amount that does not affect light transmission of the substrate polymer at 650 nm.

6. The method of claim 3 wherein the compound comprising the forensic authentication marker is present in the tagged polymer in an amount that does not affect birefringence of the substrate polymer.

7. The method of claim 1 wherein the forensic analytical technique is selected from the group consisting of resonance spectroscopy methods, SEM-EDX, XPS-ESCA, and combinations comprising at least one of the foregoing forensic analytical techniques.

8. The method of claim 7 wherein the dynamic response analytical technique is selected from the group consisting of luminescence spectroscopy, fluorescence spectroscopy, vibrational spectroscopy, electronic spectroscopy, visual observation under specific lighting conditions, color spectrophotometry, and combinations comprising at least one of the foregoing dynamic response analytical techniques.

9. The method of claim 8 wherein the forensic analytical technique is NMR and the dynamic response analytical technique is visual observation.

10. The method of claim 8 wherein the forensic analytical technique is NMR and the dynamic response analytical technique is selected from the group consisting of luminescence spectroscopy and fluorescence spectroscopy,

11. The method of claim 1 wherein the forensic authentication marker is present in the tagged polymer in an amount of no more than about 10 weight percent, based on the total weight of the tagged polymer.

12. The method of claim 11 wherein the forensic authentication marker is present in the tagged polymer in an amount of less than about 5 weight percent, based on the total weight of the tagged polymer.

13. The method of claim 12 wherein the forensic authentication marker is present in the tagged polymer in an amount of less than about 2 weight percent, based on the total weight of the tagged polymer.

14. The method of claim 13 wherein the forensic authentication marker is present in the tagged polymer in an amount of less than about 1 weight percent, based on the total weight of the tagged polymer.

15. The method of claim 14 wherein the forensic authentication marker is present in the tagged polymer in an amount of at least 0.005 weight percent, based on the total weight of the tagged polymer.

16. The method of claim 1 wherein the forensic authentication marker is at least one of alkyl groups of 2 or more carbon atoms, cycloaliphatic groups of 3 or more carbon atoms, -OCH₃ groups, -CH₃Si groups, methyl groups attached to an aryl moiety, divalent substituted phenol groups, and terminal substituted phenol groups.

17. The method of claim 16 wherein the forensic authentication marker is selected from the group consisting of -(CH₂)_n, groups where n is a number of from 4 to 14.

18. The method of claim 1 wherein the compound comprising a forensic authentication marker is a polymer having at least one forensic authentication marker.

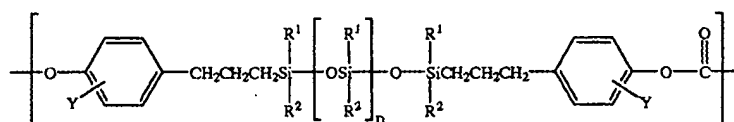
19. The method of claim 16 wherein the polymer is miscible with polycarbonate.

20. The method of claim 19 wherein the miscible polymer is selected from the group consisting of DMBPC copolymer, DDDA copolymer, eugenolsiloxane-PC copolymer, ITR-PC copolymer, poly(1,4-cyclohexanedimethyl-1,4-cyclohexanedicarboxylate), poly(ethylene naphthalate), poly(butylene naphthalate), and poly(cyclohexanedimethanol-co-ethylene terephthalate) and combinations comprising at least one of the foregoing miscible polymers.

21. The method of claim 20 wherein the miscible polymer comprises DDDA.

22. The method of claim 20 wherein the miscible polymer comprises DMBPC.

23. The method of claim 20 wherein the miscible polymer comprises a eugenol-siloxane-polycarbonate copolymer of the structure:



wherein D is between 10 and 25.

24. The method of claim 20 wherein the miscible polymer comprises an ITR-PC copolymer wherein the ITR represents 10 to 30 mole percents of the copolymer.

25. The method of claim 1 wherein the substrate polymer comprises polycarbonate.

26. The method of claim 1 wherein the dynamic response authentication marker comprises a member selected from the group consisting of an organic fluorophore, an inorganic fluorophore, an organometallic fluorophore, a semi-conducting luminescent nanoparticle, and mixtures thereof.

27. The method of claim 1 wherein the dynamic response authentication marker has a Stokes shift that is greater than or equal to about 100 nm.

28. The method of claim 1 wherein the dynamic response authentication marker is present in the tagged polymer in an amount of about 10-18 to about 2 weight percent, based on the total weight of the tagged polymer.

29. The method of claim 1 wherein the dynamic response authentication marker is detected by fluorescence spectroscopy.

30. The method of claim 1 wherein the test polymer is in the shape of a formed article.

31. The method of claim 1 wherein the test polymer is in the shape of a molded article.

32. The method of claim 31 wherein the molded article is a data storage media.

33. A method of authenticating an article, comprising
incorporating together a polymer and a compound comprising a forensic authentication marker to make a tagged polymer, the forensic authentication marker being present in the tagged polymer in an amount sufficient to be detected by a forensic analytical technique,

forming a tagged article from the tagged polymer, and

authenticating that an article is a tagged article by detecting the forensic authentication marker using a forensic analytical technique.

34. The method of claim 33 wherein the forensic authentication marker is present in the tagged polymer in an amount of from 0.005 to 1.0 weight percent, based on the weight of the tagged polymer.

35. The method of claim 33 wherein the polymer is polycarbonate.

36. The method of claim 33 wherein the forensic authentication marker is a functional group that is not present in the substrate polymer.

37. The method of claim 36 wherein the forensic authentication marker is at least one of the group consisting of $-(CH_2)_n$, CH_3- attached to an aryl group, CH_3-Si , CH_3O- , isophthalate or terephthalate moieties, and substituted phenol groups.

38. The method of claim 33 further comprising incorporating a dynamic response authentication marker with the substrate polymer and the compound comprising a forensic authentication marker to provide a tagged polymer.

39. A method of authenticating an article, comprising

incorporating together a substrate polymer, a compound comprising a forensic authentication marker, and a dynamic response authentication marker to provide a tagged polymer,

forming a tagged article from said tagged polymer, and

authenticating that an article is a tagged article by

detecting the forensic authentication marker using a forensic analytical technique, and

detecting the dynamic response authentication marker using a dynamic response analytical technique,

wherein said forensic authentication marker is present in the tagged polymer in an amount sufficient to be detected by a forensic analytical technique and said dynamic response authentication marker is present in an amount sufficient to be detected by a dynamic response analytical technique.